

REMARKS

This Amendment responses to the Office Action dated 11/14/05, that rejected the original application Claims 1-9 under 35 USC 103 by combining the disclosures of Schick in view of Higgins, or further in view of the Brown or Firth.

These original Claims 1-9 have been canceled, with Claims 11-15 being newly added now and reciting structures that distinguish over these references. Claim 10 remains in the application withdrawn from consideration.

More specifically, the invention now claims a ready to use HPLC column, complete with end coupling members that provides for mechanical connections for fittings holding the capillary lines. The column further has an outer surface extended uniformly end to end, which is the maximum outer dimension of the column.

This claimed column construction differs from the cited HPLC references.

Schick and Higgins both disclose two separate and distinct components or elements in forming the operable column: the cartridge or column subassembly and a holder or end caps/end couplings, which when assembled together form a "column". This column includes means to which fittings holding capillary lines can be connected to provide a serial flow path.

The Schick column subassembly is shown as being used with a generic type holder that defines end coupling connections for the capillary lines, while Higgins discloses several types of specific end couplings or end coupling holders, to accommodate use with

different lengths of tubular columns.

The Schick subassembly 20 has a tube 25 deformed over adjacent sealing members 32, 34. However, this subassembly 20 has no end coupling members. Instead, a separate open-sided holder 50 is bridged over the subassembly 20, with threaded openings 54 for mechanically retaining the fittings 62, 72 which hold the capillary lines 60, 70 relative to the subassembly 20.

As Schick does not disclose a column having end coupling members, it cannot suggest deforming an outer tube over a non existing end coupling member. Further, if the Schick "column" is to include both the subassembly 20 and holder 50, it does not have a substantially cylindrical outer surface from end to end that comprises the maximum outer dimension of the "column".

Higgins shows in Figs.1 and 2 a somewhat conventional column setup having threads formed on the exterior of outer tube 24, with internally threaded end caps 21, 22 fitted over and containing the end coupling members 44 and then threaded onto the outer tube. Fig. 6 shows a variation for forming a short column, having one end coupling 316 with external threads 316a suited to cooperate with an internally threaded end cap 221 that is fitted over the other end coupling member 216.

Although the Fig. 6 embodiment might initially look similar, it is different from and these differences introduce several major drawbacks compared to the claimed invention. For example, the assembled column outer diameter of cap nut 221 is significantly bulkier than the tubular column 10 (being actually an outer-outer tube threaded over the outer tube of end coupling 316). The

threaded separate components make the assembly more expensive, and also would make any temperature control much less responsive compared to the claimed HPLC column.

Also, it is presumed that all of the associated structures used with the column 10 is reusable, with only the column 10 being expendable. That being said, "column" labeling would be a problem, since any label originally placed on the column 10 would be hidden under the threaded overlapping walls of the end cap/end coupling in the assembled "column".

The cooperating end coupling and cap components 316, 221 of Higgins further would have to be specially manufactured or machined at considerable added cost, to form the threads and column lengths that would match up with the specific column. This matching further would increase inventory requirements.

The 103 rejection noted that the only difference in the original claims from Schick was the recitation of sealing members, and since Higgins shows a column with sealing members, it would be obvious to use a sealing plug in Schick as Higgins does. This rejection no longer is accurate or appropriate for the newly submitted claims as will be noted.

The new claims recite an HPLC column which includes end coupling members, providing for mechanical connections of the fittings holding the capillary lines in defining a liquid-tight serial flow path through the column. The claim recites that an outer tube overlies the inner components and the end coupling members, and has a cylindrical outer surface extending uniformly substantially end to end to comprise the maximum outer column

dimension.

Neither the Schick nor Higgins column is ready to use, but each must be combined with other structure (the holder 50 for Schick and the end couplings/cap for Higgins) for either to be used. Further, when so assembled for use, the maximum outer dimension will not be uniformly cylindrical end to end.

The Higgins end coupling 216 and cooperating end cap 221 together serve the same function as the Schick holder 50. As such, it can not be obvious to use the Higgins arrangement with the Schick outer tube and come up with anything like the claimed HPLC coupling, without using the hindsight wisdom of applicants' own disclosure.

The patents to Firth and Brown are unrelated to the invention, showing only that one can deform metal into an interference fit with adjacent structure sufficiently for high pressure containment. However, the manner of forming this column is not specifically claimed, but if it were, it would be different by using a cap-like tool pressed against the outer tube, and not by a rolling crimping tool.


The new claims distinguish over the cited HPLC references by reciting outer tube end sections inwardly deformed from the cylindrical configuration against the underlying inward parts of the end coupling members for mechanically holding the outer tube and end coupling members together. Schick has a deformed outer tube on a subassembly of a column, but without end couplings it must use a separate column holder to be functional.

As noted in the specification, the claimed invention of having

cylindrical outer column surface end to end has many advantages including: (1) it allows the column to be positioned in highly effective thermal contact with most conventional heating/cooling apparatus used for maintaining more uniform temperature control, should such be needed during a run; (2) it includes the underlying mechanically connected end couplings, leaving enough space for reliable attachment of an identifying label even for shortest column; (3) it is economical to make, as it needs only a common outer tube without any needed costly or time consuming machining of threads or the like; and (4) its maximum diameter is just slightly larger than the inner column tube itself, making for very efficient heat transfer ultimately to the column interior.

As the independent claim 11 and depending claims 12-15 thereon recite the above noted structures that distinguish over the cited patents, and as it does not seem obvious to combine the teachings of these patents, allowance of the claimed invention is believed in order and is requested.

Respectfully submitted,


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